



Please amend Claims 1, 3, 12, 14 and 17-21, as follows.

1. A spin valve (SV) sensor comprising:

a pinned layer having a pinned layer magnetization;

a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;

a spacer layer disposed between the free layer and the pinned layer;

a pinning layer disposed adjacent the pinned layer for fixing the pinned layer magnetization;

an underlayer disposed adjacent the pinning layer, the underlayer comprising NiFeX; and

an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness less than 20 Å.

2. The spin valve sensor as recited in claim 2, wherein the upper layer has a thickness of at least 4 Å.

3. The spin valve sensor as recited in claim 5, wherein the upper layer has a thickness of no more than 10 Å.

4. The spin valve sensor as recited in claim 1, wherein the upper layer is doped.
5. The spin valve sensor as recited in claim 1, wherein the underlayer comprises NiFeCr.
6. The spin valve sensor as recited in claim 1, wherein the SV sensor is a component of a disk drive system.
7. The spin valve sensor as recited in claim 1, wherein the underlayer includes 40 +/- 5 Atomic % Cr.
8. The spin valve sensor as recited in claim 1, wherein the pinned layer comprises a Ru layer.
9. The spin valve sensor as recited in claim 8, wherein the pinned layer further comprises a first CoFe layer disposed adjacent a first side of the Ru layer and a second CoFe layer disposed adjacent a second side of the Ru layer.
10. The spin valve sensor as recited in claim 1, wherein the free layer comprises a NiFe layer.
11. The spin valve sensor as recited in claim 10, wherein the free layer further comprises a CoFe layer disposed adjacent the NiFe layer.

12. A method of fabricating a spin valve (SV) sensor comprising:
- depositing an underlayer comprising NiFeX;
  - depositing an upper layer adjacent the underlayer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;
  - depositing a pinning layer adjacent the upper layer;
  - depositing a pinned layer adjacent the pinning layer, the pinned layer having a pinned layer magnetization;
  - depositing a spacer layer adjacent the pinned layer; and
  - depositing a free layer adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;
- wherein the upper layer has a thickness less than 20 Å.
13. The method as recited in claim 12, wherein the upper layer has a thickness of at least 4 Å.
14. The method as recited in claim 13, wherein the upper layer has a thickness of no more than 10 Å.
15. The method as recited in claim 12, wherein the upper layer is doped.
16. The method as recited in claim 12, wherein the underlayer includes NiFeCr.

17. A spin valve (SV) sensor comprising:
- a pinned layer having a pinned layer magnetization;
  - a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;
  - a spacer layer disposed between the free layer and the pinned layer;
  - a pinning layer disposed adjacent the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;
  - an underlayer disposed adjacent the pinning layer, the underlayer comprising NiFeCr; and
  - an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising CoFe for increasing a GMR ratio associated with the SV sensor;
- wherein the upper layer has a thickness less than 20 Å.

18. A spin valve (SV) sensor comprising:
- a pinned layer having a pinned layer magnetization;
  - a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;
  - a spacer layer disposed between the free layer and the pinned layer;
  - a pinning layer disposed adjacent the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;

an underlayer disposed adjacent the pinning layer, the underlayer comprising NiFeCr; and

an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising NiFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness less than 20 Å.

19. A spin valve (SV) sensor comprising:

a pinned layer having a pinned layer magnetization;

a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;

a pinning layer disposed adjacent the pinned layer for fixing the pinned layer magnetization;

an underlayer disposed adjacent the pinning layer, the underlayer comprising NiFeCr; and

an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness at least 4 Å and less than 20 Å.

20. A spin valve (SV) sensor comprising:

a pinned layer having a pinned layer magnetization, the pinned layer comprising a Ru layer with a first CoFe layer disposed adjacent a first side of the Ru layer and a second CoFe layer disposed adjacent a second side of the Ru layer;

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a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field, the free layer comprising a NiFe layer with a third CoFe layer disposed adjacent thereto;

a spacer layer disposed between the free layer and the pinned layer;

a pinning layer disposed adjacent the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;

an underlayer disposed adjacent the pinning layer, the underlayer comprising NiFeCr; and

an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness less than 20 Å.

21. A disk drive system, comprising:

a magnetic recording disk;

a spin valve (SV) sensor including:

a pinned layer having a pinned layer magnetization;

a free layer disposed adjacent the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field,

a spacer layer disposed between the free layer and the pinned layer,  
a pinning layer disposed adjacent the pinned layer for fixing the  
pinned layer magnetization,

an underlayer disposed adjacent the pinning layer, the underlayer  
comprising NiFeX, and

an upper layer disposed adjacent the underlayer and the pinning layer,  
the upper layer comprising a material selected from the group consisting of  
NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

an actuator for moving the SV sensor across the magnetic recording disk so  
the SV sensor may access different regions of magnetically recorded data on the  
magnetic recording disk; and

a controller electrically coupled to the SV sensor for detecting changes in  
resistance of the SV sensor;

wherein the upper layer has a thickness less than 20 Å.

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